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## PSYCHOLOGICAL EFFECTS OF A STRUCTURED PROGRAMME FOR PREPARING BARIATRIC SURGERY PATIENTS

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**Abstract:** A bariatric surgery preparation programme based on cognitive behavioural techniques was designed and implemented in a sample of 50 candidates for bariatric surgery. All participants completed the BDI short-form and STAI (E-R) questionnaires before and after the programme implementation (Groups 1 and 2) and again after a three-month follow-up (Group 2). The programme's results are presented in terms of its effect on anxiety and depression levels three months after surgery. We found significant differences in depression and trait anxiety between pre- and post-treatment measures in both groups. Group 2 also showed significant differences between the pre-treatment and follow-up measures, but not between the post-treatment and follow-up measures. In the case of state anxiety, Group 2 showed differences between pre-programme implementation and follow-up with a large effect size, but not in the other comparisons. Conclusion: The results show a significant post-treatment reduction of anxiety and depression in bariatric surgery patients before surgery. These results do not remain stable during the follow-up and the authors are not able to establish a causal relationship.

**Key words:** Morbid obesity, bariatric surgery, cognitive behaviour therapy, anxiety, depression, psychological assessment.

**Resumen:** Se ha diseñado y aplicado un programa de tratamiento cognitivo-conductual para pacientes que van a ser sometidos a cirugía bariátrica. Se presentan los resultados referidos a la ansiedad y la depresión, tres meses después de su aplicación. Cincuenta candidatos a cirugía bariátrica completaron los cuestionarios BDI y STAI (E-R) antes y después de la implementación del programa (grupos 1 y 2), y nuevamente después de tres meses (grupo 2). Se han encontrado diferencias significativas en depresión y en ansiedad-rasgo antes y después de la aplicación del programa en ambos grupos. Asimismo, el Grupo 2 mostró también diferencias significativas entre el pre-programa y el seguimiento, pero no entre el post-programa y el seguimiento. Respecto de la ansiedad-estado, el Grupo 2 sólo mostró diferencias entre el pre-programa y el seguimiento con un tamaño del efecto muy alto. Los resultados muestran una reducción significativa en los niveles de ansiedad y depresión en los pacientes después del tratamiento y antes de ser sometidos a la cirugía bariátrica. Estos resultados no se mantienen estables durante el seguimiento y no se ha podido establecer una relación causal.

**Palabras clave:** Obesidad mórbida, cirugía bariátrica, terapia cognitivo-conductual, ansiedad, depresión, evaluación psicológica.

Title: *Efectos psicológicos de un programa estructurado para preparación de pacientes a cirugía bariátrica*

Bariatric surgery is considered one of the best alternatives for the treatment of

morbid obesity, and excellent results have been obtained for weight loss and its maintenance. The number of patients who undergo this type of surgery has gradually increased due to the good results obtained and the advances in surgical techniques (Buchwald, 2000, 2005; Buchwald et al., 2004).

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After many years of deep-rooted habits, patients must modify their dietary habits over a short period of time and must adapt to a new personal image and a new situation that produces a marked improvement in their quality of life and their psychosocial functions. Psychological group interventions for these patients are becoming increasingly common as a means of facilitating these processes and preventing associated problems (Branderburg & Kotlowski, 2005; Hildebrandt, 1998; Madam & Tichansky, 2005; Marchand et al., 2007; Marcus & Elkins, 2004; Orth et al., 2008; Saunders, 2004). Furthermore, it is necessary to consider that for a large percentage of these patients, levels of trait and state anxiety and depression are above the average for the general population (Greenberg, Perna, Kaplan, & Sullivan, 2005; Sarwer, Wadden, & Fabricatore, 2005; Sarwer & Fabricatore, 2008; Simon et al., 2006). However, we are not aware of these kinds of psychological group interventions in Spain.

Therefore, to improve surgical results (weight loss after surgery) and to facilitate changes in life style (particularly to establish long-term healthy eating habits), the Multidisciplinary Unit of Health Care for Obese Patients (UMAIO) at the Alicante General University Hospital has established the Multidisciplinary Programme for Pre-Surgery Group Intervention (van-der Hofstadt et al., 2010). This programme includes nutrition education that focuses on preparing patients for surgery, achieving pre-surgery weight loss to reduce surgical risks, understanding healthy lifestyles and healthy eating habits. The programme also involves a psychological component consisting of a cognitive-behavioural intervention, which includes psychological assessment, relaxation training and discussion of eating habits and lifestyle with patients undergoing bariatric surgery to improve en-

agement, retention, compliance and outcomes of weight loss surgery.

The programme began in February 2009. It is applied to groups of 5 patients and lasts 6 weeks. Each session is two and a half hours. Participants are assigned to groups according to the order of their arrival at the UMAIO.

The programme is implemented at the same time that patients follow a very low-energy diet (VLED) of 800 calories and targets the use of the following techniques and strategies:

1) *Relaxation training*. Jacobson progressive muscle relaxation (Bernstein, Borkovec, & Hazlett-Stevens, 2000) is used by following a commercial recording that provides precise indications for performing the relaxation exercises (van-der Hofstadt, Quiles, & Quiles, 2007).

2) *Cognitive restructuring*. Cognitive restructuring is used to identify, analyse and modify negative, irrational or distorted thoughts associated with food intake behaviours through self-recording, which has proved to be an efficacious technique for developing self-control (Rehm, 1998).

3) *Training in problem solving*. Training in problem solving is used as a strategy for preventing relapses and for maintaining achievements. It is conducted by following the steps proposed by D'Zurilla and Goldfried (1971).

4) *Information and education* about various aspects related to the diet to be followed during the different phases of the process, the surgical technique, and aspects related to hospital admission and follow-up.

Given the general purpose of evaluating the effects of the programme in relation to the outcome of bariatric surgery, the aim of this paper is to assess the effects of this programme on the reduction of anxiety and depression levels immediately after the programme's completion but before sur-

gery and three months after surgical intervention.

**Method**

*Participants*

There were two sample groups consisting of patients who attended the *Multidisciplinary Programme*. Group 1 was composed of 25 patients who were evaluated before and after the *Multidisciplinary Programme*. These patients were not evaluated at follow-up because they were awaiting surgery. One of the main threats in this type of designs is selection bias because the sample is not randomised. Therefore, systematic bias may lead to a difference in the study group that explains the results. To eliminate this threat, another group of 25 patients from the same population of patients with morbid obesity was used (Group 2). We then determined whether these groups were homogeneous in terms of the target variables. Patients in Group 2 were evaluated before and after treatment as well as at follow-up.

Descriptive statistics are given in Table 1. Contingency coefficient C was applied to challenge the hypothesis that the distribution of the socio-demographic variables was independent of the group. The results show that the two groups were homogeneous in terms of education level ( $C = 0.29; p = .20$ ), marital status ( $C = 0.15; p = .55$ ), employment situation ( $C = 0.21; p = .82$ ) and age ( $t_{47} = -0.07; p = .94$ ), but not in terms of gender ( $C = 0.31; p = .02$ ).

Because Group 1 had not yet received surgery, there are no data on weight loss. The average weight for Group 2 was  $137.20 \pm 23$  kilos (BMI =  $48.5 \pm 7$ ) at the beginning and  $101.3 \pm 19.8$  kilos (BMI =  $35.9 \pm 7$ ) at follow-up. This difference was both statistically significant ( $t_{24} = 17; p = .00$ ) and clinically relevant, and the effect size of the treatment was very high ( $d = 3.40$ ). In contrast, the average weight for Group 1 was  $125.3 \pm 20.1$  kg and the average height was  $1.6 \pm 0.1$  meters, for a resulting BMI of  $48.2 \pm 5.9$ . The comparison of the two groups at the pre-treatment time showed they were not statistically different

Table 1. Means (SD) and percentages of sociodemographic variables

	Whole group (N=50)	Group 1 (N=25)	Group 2 (N=25)
Sex	62% women	76% women	48% women
Age	42.6 (9.6)	42.8 (8.9)	42.4 (10.5)
Marital Status	22% single	20% single	24% single
	68% married	72% married	64% married
	10% separated/divorced	8% separated/divorced	12% separated/divorced
Educational Level	8% no education	16% no education	
	52% primary education	48% primary education	56% primary education
	26% secondary education	24% secondary education	28% secondary education
	14% higher education	12% higher education	16% higher education
Employment Situation	40% working	36% working	44% working
	14% sick	20% sick	8% sick
	8% retired	8% retired	8% retired
	18% unemployed	16% unemployed	20% unemployed
	14% housewife	16% housewife	12% housewife

in either weight ( $t_{47} = -1.9$ ;  $p = .06$ ) nor BMI ( $t_{48} = -0.2$ ;  $p = .87$ ), although they differed in height ( $t_{48} = -2.9$ ;  $p = .005$ ). In Group 1, %EBMIL reached 57%. Therefore, the two groups are considered equivalent in terms of socio-demographic and anthropometric characteristics.

#### *Instruments*

The study included the following variables.

- Socio-demographic variables: age, sex, marital status, education and employment. All of these variables were recorded during patients' first interview after contacting the unit.

- Morphological variables: initial weight and height and weight at follow-up. The first two variables were measured in the first interview, and the last variable was recorded at follow-up. All measurements were taken *in situ* using a bariatric scale. Body mass index (BMI) and excess weight (%EWL) were derived from Hamwi equations (Carney & Meguid, 2002). In addition, the percent of excess BMI loss (%EBMIL) was calculated following Cigaina's recommendations (Cigaina, 2002).

- Anxiety was measured with the State-Trait Anxiety Inventory by Spielberger, Gorsuch and Lushene (1970). The Spanish version by Seisdedos (1998) was used. This questionnaire is composed of 40 items; the first twenty assess anxiety symptomology as a transitory reaction (subscale of state anxiety, STAI-E) and the other twenty attempt to identify the presence of anxiety as a persistent personality trait (trait anxiety subscale, STAI-R). All items are answered on a Likert scale ranging from 0 to 3. On the STAI-E subscale, the answers for each item range from "nothing" (0 points) to "a lot" (3 points). On the STAI-R subscale, the answers range from "almost never" (0 points) to "nearly always" (3 points). The

STAI has discriminant validity and good internal consistency.

- Depression was assessed using the Beck Depression Inventory-Short Form (BDI-SF). The Spanish version by Conde and Franch (1984) was used. This questionnaire evaluates depression from a cognitive perspective and consists of 13 items that correlate with the total score of the original questionnaire of 21 items and with the clinical evaluation of the severity level. Each item is answered on a four point Likert scale, ordered from the least serious to the most serious (from 0 to 3 points). The person has to choose the phrase that most closely reflects how he or she has felt in the last week. Because this is a summative scale, the final score ranges from 0 to 39 points.

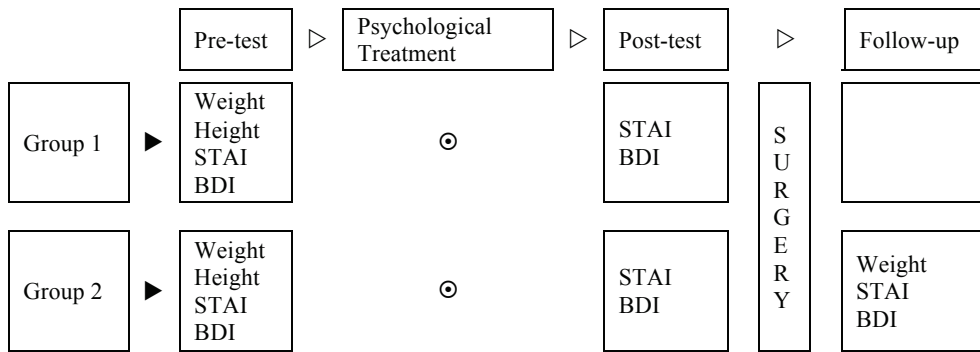
#### *Procedure*

The questionnaires were administered by the clinical psychologist in charge of the programme (treatment) in the hospital psychological clinic. In the first session of the programme, the questionnaires were administered collectively, corresponding to the pre-test. In the last session of the programme (sixth session), tests were again conducted collectively under the same conditions (post-test). An average of three months after the surgical intervention of the patients included in the programme, the patients were given an appointment by telephone to participate in a follow-up group session in accordance with the programme protocol (van-der Hofstadt et al., 2010). Questionnaires were again administered collectively (follow-up).

#### *Statistical Analysis*

Data were analysed by calculating the appropriate statistics for central tendencies and dispersion for each group (that is, the arithmetical average and typical deviation). Because the dependent variables did not comply with the independence assumption required by the analysis of variance, the

Figure 1. Variables assessed per group and over time



groups were compared in pairs using Student's t tests for related samples, adjusting the Type-I error value ( $\alpha=.05$ ) with Bonferroni correction. Thus, for six comparisons (Group1-Group 2 pre; Group1-Group 2 post; Group 1 pre-post; Group 2 post-follow-up; Group 2 pre-follow-up; Group 2 pre-post), we worked with a value of 0.008. Furthermore, in all cases, the effect size was calculated with d and r indices. The analyses were conducted with the programme PASW Statistics 18, except for the calculation of effect size, which was performed with Excel 97.

## Results

### *Equivalence of groups*

With regard to the dependent variables, the average differences for the independent samples produced non-significant results. Therefore, the two groups have equivalent depression and anxiety scores (both trait and state) at both pre-treatment and post-treatment measurements (see Table 2). The absence of differences between Groups 1 and 2 allows us to rule out potential bias in the composition of Group 1 that may have affected the results.

### *Differences in anxiety and depression at pre-test, post-test and follow-up*

Table 3 shows the results of the differences in intrasubject averages. We can ob-

serve that for the whole group there are significant and relevant differences in depression and trait anxiety scores between pre-treatment and post-treatment measurements. In accordance with Cohen (1988), the effect size can be considered high. The same trend is repeated in both groups and we find non-significant results only for anxiety state scores.

The analysis of the results of the follow-up, which was conducted for Group 2 only, shows differences in these three variables between pre-treatment and follow-up but not between post-treatment and follow-up. These results are reinforced by the treatment effect sizes obtained, which reach high values in all cases.

## Discussion

Even though there was not a control group of bariatric surgery patients who did not participate in the multidisciplinary programme before surgery, the results of this study suggest that the programme facilitates the immediate reduction of trait anxiety and depression in the pre-surgery period. If that is the case, this reduction could contribute to improved psychological functioning and to maintaining weight loss after surgery. Furthermore, this reduction contributes to improving patients' quality of life. Other factors included in our pro-

Table 2. Means (SD) of the variables

	Whole Group (N=50)		Group 1 (n=25)		Group 2 (n=25)		Follow up
	Pre test	Post test	Pre test	Post test	Pre test	Post test	
Weight	131.7 (22.2)	n.a.	126.3 (20.3)	n.a.	137.2 (23)	n.a.	101.3 (19.7)
Height	1.7 (0.09)	n.a.	1.61 (0.09)	n.a.	1.68 (0.08)	n.a.	1.7 (0.09)
BMI	48.4 (6.4)	n.a.	48.3 (5.9)	n.a.	48.5 (7.1)	n.a.	35.9 (6.7)
BDI	8.2 (5.8)	4.6 (5)	8.7 (5.5)	4.7 (5.1)	7.8 (6.3)	4.5 (5.1)	2.8 (3.4)
STAI-R	27.7 (12.6)	19.1 (11.5)	30 (13.3)	20.4 (11.9)	25.4 (11.7)	17.9 (11.2)	13.7 (9.8)
STAI-E	19.8 (11.7)	16.4 (11.1)	19.9 (12)	16.4 (11.5)	19.6 (11.6)	16.4 (10.9)	9 (10.3)

n.a.: not available

Table 3. Mean difference of the variables

	BDI			STAI-T			STAI-S		
	Pre- Post	Pre- Fol.	Post- Fol.	Pre- Post	Pre- Fol.	Post- Fol.	Pre- Post	Pre- Fol.	Post- Fol.
Whole group									
t; p	<i>5.9;.00</i>			<i>4.7;.00</i>			1.9;.06		
d	0.85			0.67			0.27		
r	.65			.56			.26		
95% CI	[2.2, 4.5]			[4.7, 11.8]			[-0.2, 6.8]		
Group 1									
t; p	<i>4.8;.00</i>			<i>2.9;.01</i>			1.7;.11		
d	0.99			0.59			0.34		
R	.70			.51			.32		
95% CI	[1.9, 4.9]			[2.6, 15.6]			[-0.8, 7.7]		
Group 2									
t; p	<i>3.7;.00</i>	<i>3.4;.00</i>	1.5;.15	<i>4.3;.00</i>	<i>4.5;.00</i>	1.7;.11	1.1;.27	<i>4.8;.00</i>	2.2;.04
d	0.74	0.67	0.30	0.86	0.90	0.34	0.23	0.97	0.45
r	0.61	0.57	0.29	0.67	0.68	0.33	0.23	0.71	0.42
95% CI	[1.4, 5.1]	[1.9, 8]	[-0.7, 4.1]	[1.7, 3.9]	[2.6, 6.3]	[-0.9, 9.3]	[-2.6, 8.9]	[2.2, 5.9]	[0.4; 14]

\* Significant differences are highlighted in italics.

gramme contribute to quality of life but are not considered here (van-der Hofstadt et al., 2010).

In spite of the fact that anxiety and depression levels have only a tangential relationship with lifestyle changes, the reduction of these levels is directly related to an

increase in personal self-control, and these levels can be matched reliably with health care practices for patients with morbid obesity (Krukowski, Friedman, & Applegate, 2010).

From the presented results, we can identify a relationship between participation in

the programme and a decrease in anxiety and depression levels. Patients' scores were reduced significantly in both variables and these results were maintained at the three-month follow-up, at least in Group 2. The reduction of anxiety levels before surgery and the improvement of patients' state of mind have been presented as ways of facilitating surgery and decreasing the number and severity of post-surgery complications (Devine, 1992; Greenberg et al., 2005; Johnston & Vögele, 1993; Walker, 2002). This effect has not been verified in this study, but it is important for future studies to examine this effect.

It is interesting to note that although anxiety state scores do not decrease significantly after the programme, anxiety trait scores do. This result may be related to the proximity of surgery and the increase in anxiety typical of this circumstance because the surgical intervention is usually performed almost immediately (less than a week) after the completion of the programme (or up to one month after). However, at the three-month follow-up, the anxiety state scores demonstrate a statistically significant reduction, which is comparable to the reduction that occurs in anxiety trait scores at the completion of the programme. A limitation of our study involves the difficulty in attributing the results to a particular component of the programme. That is, it is not possible to know which technique has facilitated the changes in the subjects. Moreover, although the techniques are directly oriented toward the improvement of self-control, other variables may cause these changes, such as the information received by patients, which reduces uncertainty and contributes to decreasing anxiety

scores, or the group interaction between patients with similar circumstances, which may decrease depression levels.

Because this study did not include a control group that did not receive the treatment, we could not implement an experimental design that would reinforce the internal validity of the study. However, the groups were shown to be equivalent both at the beginning and the end of the programme. This finding indicates that the efficacy of the treatment was not specific to Group 2, the group that received the follow-up treatment. The treatment was efficacious for all participants, allowing us to exclude threats to internal validity based on *history* and *differential selection*. We suggest that the *standardised procedure*, which was used in our treatment programme to teach relaxation, reduced some of the variability in the results related to the therapists.

The analysis of the results of the programme follow-up, planned for up to three years after the treatment, is pending. Other resources and treatments should be added to the programme to help maintain long-term changes and to permit the incorporation of professional help for patients. In this sense, the *self-help groups* and the *expert patient* represent important strategies generated by the group treatments.

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